ODP-81-1154
2 SEP 1981

MEMORANDUM FOR: Director of Logistics

FROM : Bruce T. Johnson
Director of Data Processing

SUBJECT : Utilities for ODP Computers

REFERENCE : Memorandum for D/ODP from O/L, dtd 24 Aug 1981, Same Subject. (OL 13293a, ODP 81-1117)

Jim:

1. The referenced memorandum requests that we allow the joint (OL, ODP, OC) committee currently addressing reliability of our utility system to complete its report prior to initiating any action to upgrade our utility performance. Of course, this is a reasonable request and we concur. We are looking forward to this committee promptly preparing its report to allow us to get on with constructing a solution to our utilities problems. On the subject of prime time repair of utilites, we recognize that there may be instances where this is inevitable. We ask, however, that every effort be made to schedule non-critical repairs to minimize the impact on Agency computer customers. We wish to work with your personnel on this matter. The ODP contact is [redacted] STAT
STAT [redacted] Chief, Configuration and Environmental Management Branch, Engineering Division. Steve may be reached on [redacted] STAT (black).

2. Finally, we appreciate your offer of a tour of ongoing utilities projects and would be very interested in
STAT participating. [redacted] the ODP Executive Officer, would be the appropriate ODP individual to schedule the tour. Please have your staff contact George [redacted] to STAT arrange a mutually agreeable date.

OL 1 3723

3. We in ODP appreciate your thoughtful response to our request for assistance. We have no doubt that the Office of Logistics is concerned about this problem and is working diligently on a solution. I am sure that continuing this dialogue will help us to develop the finest utilities support for Agency computer centers that technology and resources will allow. When the joint committee completes its study, I hope we can promptly arrange a meeting to discuss the implementation of the recommended solutions to our utilities problems.

STAT [redacted]

Bruce T. Johnson

STAT cc: [redacted]

Re: Proposed ODP Facilities Support

ROUTING AND RECORD SHEET

SUBJECT: (Optional)
Utilities for ODP Computers

FROM:
Director of Data Processing
2D00, Hqs.

EXTENSION | NO.

DATE
3 September 1981

TO: (Officer designation, room number, and building)	DATE RECEIVED	DATE FORWARDED	OFFICER'S INITIALS	COMMENTS (Number each comment to show from whom to whom. Draw a line across column after each comment.)
1. Director of Logistics 2G20B, STAT				ROD: PLEASE HANDLE WITH STAT - ASK CHUCK TO PREPARE A QUICK RESPONSE TO DAN'S QUESTION RE "HOW IS THE STUDY COMING?" - ALSO ASK CHUCK TO COORDINATE THE TOUR WHICH WAS ACCEPTED IN HQ 2. - NOTE 15 SEPT SUSPENSE ON HQ 2. YOUR ACTION TO OVERSEE ABOVE ROD. Tony 9/10/81
2.				
3. DC/RECD		9/14		
4.				
5. C/HEB.	9/16	9/16		
6. DC/RECD	12/22	12/22		
7.				
8.				
9.				
10.				
11.				
12.				
13.				STAT 14 Oct. 1400 hrs. 5 to 6 Study is complete. Who retains this? I suspect OL Registry
14.				
15.				

FORM 1-79 610 USE PREVIOUS EDITIONS

ROUTING AND RECORD SHEET

SUBJECT: (Optional) UTILITIES RELIABILITY STUDY

FROM: C/ICEC

EXTENSION | NO.

DATE 12/10/81

TO: (Officer designation, room number, and building)	DATE RECEIVED	DATE FORWARDED	OFFICER'S INITIALS	COMMENTS (Number each comment to show from whom to whom. Draw a line across column after each comment.)
1. DDL				
2. EO/OL				
3. D/L				
4. DAD/I				
5.				
6. ATTACHED IS A COPY OF THE UTILITIES RELIABILITY STUDY				
7. PREPARED BY THE UTILITIES RELIABILITY COMMITTEE CONSISTING				
8. OF O/L, O/C, AND ODP REPRESENTATIVES AS INDICATED				
9. HEREIN. COPIES OF THIS COMPLETED AND JOINTLY SIGNED				
10. STUDY ARE HELD IN THE HANDS OF THESE O/C AND ODP				
11. REPRESENTATIVE. THE APPROPRIATE PEOPLE WILL BE BROUGHT				
12. TOGETHER TO DISCUSS ANY ASPECTS OF THE STUDY THAT YOU				
13. MAY DESIRE. WE AWAIT YOUR COMMENTS AND FURTHER				
14. GUIDANCE ON THE MATTER.				
15.				

[redacted] 12/10/81

STAT

FORM 1-72 610 USE PREVIOUS EDITIONS

DEC 1981

UTILITIES RELIABILITY STUDY

I. The Utilities Reliability Committee was established as an ad hoc group of representatives from the Office of Communications (OC), Office of Data Processing (ODP), and the Office of Logistics(OL). The task assigned was to determine the utility reliability needs of the Agency's critical utilities consumers and to examine the present utilities systems ability to satisfy those needs.

The committee consisted of:

STAT [redacted] Chief, Configuration and Environmental Management Branch (ODP/ED/CEMB)

STAT [redacted] Chief, Engineering Staff, Technical Support Branch (OC/DND/TSB)

STAT [redacted] Chief, Headquarters Engineering Branch (OL/RECD/HEB)

representing each of the three offices. From time to time, others were involved in the committee processes as advisors and as participants in the absence of a designated member.

II. The committee's activity was divided into three phases (Attachment A). Phase one consisted of identifying the customer's requirements and itemizing problem areas by systems. The requirements portion of this effort is shown in Attachment B. Accordingly, the following levels of utilities reliability were

considered acceptable:

Office of Communications - four unscheduled outages per year.

Office of Data Processing - one unscheduled outage per year.

A. An outage for the purposes of this study is either a total outage or a rapid excursion beyond the equipment's utilities tolerances.

B. The equipment used by the OC is adversely affected by a utility outage for the period of the outage plus an approximate one-half hour service restoration period. The OC equipment is apparently very hardy and, once restored to an operational mode, it operates relatively error free.

C. The equipment used by ODP is adversely affected by a utility outage for the period of the outage plus a four- to six-hour service restoration period. The ODP equipment is apparently less hardy than OC's and once restored to an operational mode, it is prone to further malfunctions for an additional two weeks.

D. Both groups of equipment are also affected by slow excursions or by utilities services whose characteristics linger about the outer limits of the equipment specifications. These conditions usually follow when equipment

changes are made and previously acceptable conditions are subsequently taxed just beyond reliable operational limits.

III. The second phase consisted of examining the effectiveness of the present system of utilities support for this special equipment.

A. The need to provide redundant utilities services became a requirement beginning in the 1969-70 period. Utilities problems became severe and the Headquarters Engineering Branch was created to address the problems. The solutions began with the condition that critical utilities should be automatic, autonomus, and redundant. Because of the limited and centrally located equipment, the solutions to provide a motor-generator set to smooth transient electrical excursions, as well as provide 415 Hz power; to install groups of small chillers; and to backup all of them with a dedicated emergency generator were effective. But the utilities requirement continued to grow. The motor-generator sets were either discarded or relegated to a backup position behind new Uninterruptible Power Systems (UPS). The number of these UPS's has grown to four with two more to be added by Project SAFE. The single diesel generator of 2500 KW is now one of five similarly sized units. The redundant chillers are now

barely useful as requirements have increased. No backup chiller is provided for Project SAFE as space to install such a unit is basically unavailable. The recourse has been to provide both primary and redundant chilled water at the General Services Administration (GSA) Powerplant a quarter of a mile from the served equipment. The situation has now gone full circle from initially isolating critical equipment from the routine levels of operation and maintenance and providing special redundancy to the present mode where the only economical and practical solution appears to be to rely on the GSA operated and maintained Powerplant.

B. A second feature of this critical equipment expansion has been lack of accurate long-range planning. The speed of proliferation of electronic equipment was not foreseen. As a result, the utilities support was generally accomplished on a short schedule to accommodate an urgent requirement. In such a time dominated atmosphere, expedient design solves the immediate problem at the expense of long-range needs, including reliability. This comment is made in a constructive, informational way and is not intended to provoke a discussion on the virtues of hindsight.

C. As the complexities of the utilities system increased, it might be expected that the [illegible]

system would expand also. After all, the basic reason for the first automatic autonomus and redundant systems was to provide an operation posture above that received from GSA equipment and manpower standards. Such was not the case as evidenced by programs to reduce personnel levels both by Agency managers as well as national administrations. Doing more with less became the goal. Attempting to procure more service from GSA by offering reimbursement for operation and maintenance personnel for the emergency generators and special system preventive maintenance has been less than totally fruitful as GSA has gone through personnel reductions and is presently in a hiring freeze mode with a reduction in force rumored.

D. In the private sector, the UPS's maintenance needs have been contracted solely to the respective UPS manufacturer to achieve maximum reliability. Here also, the level of effort has depended on the competence of the assigned technician except when the frequency of failures becomes sufficiently high to embarrass the company's management into sending a technically superior troubleshooter to solve the problem.

E. The general evaluation of the present systems is detailed in Attachment C. The evaluation is naturally against the more strict one outage per year requirement of ODP. To

allow for a greater number of outages such as the four per year acceptable by OC could reasonably be expected without significantly changing the present modes of utilities support.

IV. The committee's recommendations are of necessity general. See Attachment D.

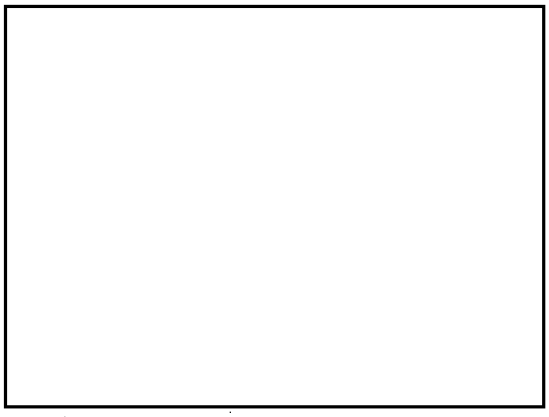
A. Regardless of which courses of action are pursued, it was perceived that the future requirements for electronic equipment for the Agency are far reaching. Project SAFE will provide a new terminal system in the analyst's environment. The backlog for present terminal installations requirements has multiplied by a factor of six, creating Project Speedwire with multiyear funding forecasts. The Information Handling Systems Architect/DDA has been created. As more daily work operations become computer dependent, the climate for reliable service will change from one of concern to one of severe or unacceptable impact. This need to provide extraordinary reliability will generate stricter controls on all phases of utilities support in concert with all other components in the end-to-end chain between the point of utility generation and the user's terminal. It seems, therefore, that more strict control in the form of modified configuration control is inevitable if the Agency continues

toward total reliance on automated data processing.

B. To continue, as in the past, at funding consistent with current forecasts should allow utilities reliability to closely approach OC's four-outage-per-year minimum with the addition of a technical condition survey of the existing system. This survey is estimated to cost around $500,000 and can be scheduled consistent with the Agency's desire to achieve increased reliability. To achieve ODP's one outage per year will require the initial survey followed by or incorporated in an annual maintenance and engineering effort of $2,000,000 to $8,000,000 to approach the conditions of a satellite ground station. Probably this effort would be a contractural arrangement with a company rather than with GSA.

C. As a side issue related to overall reliability, but not necessarily dealing with utilities, a four to six hour period of computer down time historically occurs as the result of a short utilities malfunction. Should the computer industry develop more hardy hardware that is less susceptible to utilities anomalies, the utilities reliability requirements could become less important. The present advances in hardware seem to be in reducing the

size and the electrical power consumption while increasing the computer power rather than in improving the hardiness or robustness against utilities anomilies.



STAT

UTILITIES RELIABILITY AGENDA

I. Identification of Problem Areas

A. Itemize problem areas by utility system.

B. Quantify "uptime" requirements in problem areas in terms of:

1. percentage "uptime" per year

2. total outages per year

3. excursions from load tolerance bandwidth

4. scheduled outages versus unscheduled

5. other appropriate parameters

II. Evaluation of present systems in terms of meeting uptime requirements.

A. Systems configuration.

B. Systems hardware.

III. Recommend changes.

Approved For Release 2005/07/12 : CIA-RDP86-01019R000200030003-8

REQUIREMENTS

I. Utility Outages

A. Scheduled - as necessary

B. Unscheduled - not to exceed 1 hour in duration

(1) OC - 4 per year per system

(2) ODP - 1 per year per center (2 centers)

II. Capacity Requirement - 1987

A. ODP

(1) 400 Hz: per attached schedule; all new computers at 40kVA

(2) 60 Hz:

a. GC03/1D16 complex
1300 kVA including 2 frequency converters

b. GC47
500 kVA

B. OC

(1) 1100 kVA 60 Hz*

(2) 50 kVA 400 Hz

*A small portion may not impact A vault.

III. Utility Tolerances - any excursion beyond these tolerances is considered an outage.

A. Cooling

(1) underfloor air 50 degrees to 65 degrees F
50% to 70% R.H.

(2) above floor air 70 degrees to 85 degrees F
45% to 65% R.H.

(3) water cooling 45 degrees F to 60 degrees F
28 to 38 GPM per processor
no flow interruption of more than 3 minutes.

B. Power

(1) 60 Hz

a. frequency plus minus 1/2 Hz

b. steady state voltage
208 volts + 6%, -8%

c. transient voltage +15%, -18%

(2) 415 Hz

a. frequency plus minus 20 Hz

b. steady state voltage
208 volts plus minus 2%

c. transient voltage plus minus +8%, -15%
half sec.
.5 sec. recovery

I. Present System Evaluation

To target for zero outages with the maximum tolerable limit being 1 outage per computer center, it will be necessary to configure and operate the utility system in a fashion similar to a satellite ground station. The present system fails to meet in following areas:

A. Hardware maintenance and reliability

B. Hardware system design

C. Operational control

II. As a starting point the following general areas should be addressed:

A. Hardware Maintenance and Reliability

1. UPS are not performing to specification

2. Level of utility maintenance is unacceptable

B. Hardware System Design

1. 400 Hz system design is inadequate

2. VEPCO reliability varies, according to how and when VEPCO changes other system variables

3. Raised floor clearances in GC03 are insufficient for the proper air flow

C. Operational Control

1. GSA's performance in the area of operational control is non-existent.

2. Changes in computer loads have not been coordinated closely enough. Ground stations generally employ some variation of configuration control. At the present time, computer load projections have not allowed sufficient time for utility system changes (or conversely, utility systems have not changed fast enough to respond to new computer requirements). This results in time deadline dominated rather than reliability dominated utility systems designs.

3. In addition, the respective roles of CEMB and HEB in utility system planning and operation need to be better defined.

RECOMMENDATIONS

I. Assumptions

A. UPS's are necessary to meet tolerance requirements.

B. There will be one 400 Hz and one 60 Hz UPS per ODP center fed from the same electrical source.

C. The utility system expansion must start now to meet 1987 load projections.

D. ODP and OC will remain on the south side of the building as load/space requirements increase.

II. Possible Hardware Changes

A. Bring UPS up to specification.

B. Redesign 400 Hz system.

C. Investigate reconnection to VEPCO or otherwise increase VEPCO reliability.

D. Provide new southside power vault and UPS.

E. Provide additional northside electrical feeder.

F. Provide HVAC enhancement in GC03 through:

1. removing old cable, controlling installation of new cable.

2. providing more air handlers.

3. raising floor.

4. opting for computer communications that require less cable.

5. all of above.

G. Replace 3 chillers at Powerplant.

H. Add air handlers and increase C.W. piping sizes to both ODP and OC for projected load increase and redundancy.

I. Add more back-up generating capacity.

J. Replace C.W. lines from Powerplant.

III. Possible Maintenance Changes

Eliminate or upgrade GSA effort. Catch up on extensive backlog of "one outage" maintenance items.

IV. Possible Operational Changes

A. Provide better and more regular computer load projections.

B. Consider "overexpanding" the utility system. This would minimize facilities considerations in computer system planning.

C. Provide some type of configuration control, though not as formal as used at some ground stations, as an alternative to IV.B. above.

V. Other Considerations

A. Investigate the relaxation of outage limitation. (Perhaps 4 per year?)

B. Removing the computers to another building which would be designed and operated in the high reliability mode of a ground station.